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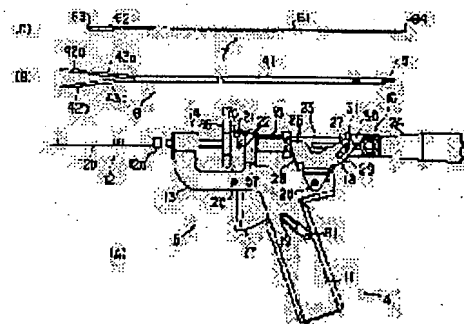
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(54) FORCEPS

(57)Abstract:

PROBLEM TO BE SOLVED: To ensure a sufficient gripping force even when the diameter of an insertion part is made thinner by a method wherein for forceps wherein a pair of gripping members and incision means are provided at the tip end of the insertion part which is inserted in a human body, the incision means under an offset state is arranged in parallel at a location which is away from a moving track of supporting elements of respective gripping members.

SOLUTION: For a bi-polar forceps having incising function, at the tip end of an insertion part 12 which is inserted in a body cavity of a patient, a treatment unit is arranged, and a forceps unit 6 and knife unit 7 are detachably installed. For the forceps unit 6, at the tip end of a thin and long rod part 41, a pair of jaws 42a, 42b, and supporting arms 43a, 43b which urge the jaws 42a, 42b in the opening directions are provided. In the meantime, for the knife unit 7, a knife 62 is provided at the tip end of a thin and long knife rod 61, and the knife 62 is arranged in parallel under an offset state, at a location which is away from a moving track between the supporting arms 43a, 43b when the jaws 42a, 42b are opened/closed.



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CLAIMS

[Claim(s)]

[Claim 1] While the grasping member of the pair opened and closed to the point of the insertion section inserted in the inside of the body is arranged in forceps equipped with an incision means to extend possible [attitude actuation] and to operate independently with said grasping member to the point side of said insertion section Forceps characterized by having arranged said incision means to juxtaposition in the state of offset in the location from which it separated from the migration orbit of the support element of each of said grasping member at the time of the switching action between the grasping members of said pair. ✓

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to the forceps with which an incision means to cut open the grasping member and body tissue of a pair which are opened and closed to the point of the insertion section inserted in the inside of the body was arranged, respectively.

[0002]

[Description of the Prior Art] The forceps with which incision means, such as a knife which cuts open the grasping member and body tissue of a pair which are generally opened and closed to the point of the insertion section inserted in the inside of the body, were arranged, respectively are known. The following configurations are shown in USP5,458,598 (example 1 of precedence) as an example of these forceps.

[0003] That is, the end face section is prepared in the forceps of the example 1 of precedence possible [****] from the tip of the long and slender pipe connected with the control unit by the side of a hand, and this pipe, and the grasping member of the pair which has the relation from which each other was insulated, and the knife blade for cutting a body tissue open are prepared. Here, the end face section of the grasping member of a pair is connected to the support arm which consists of an elastic member of a circular cross section, respectively. And it is energized by these support arms in the open direction between each grasping member.

[0004] Moreover, the grasping member and support arm of a pair are arranged to the medial axis of a pipe at the position of symmetry, respectively. Furthermore, the blade of a knife is arranged possible [longitudinal slide movement] in the direction of a medial axis at the medial-axis top of a pipe. And a support arm opens a grasping member in the condition of having projected from the tip of a pipe, and where the tip and support arm of a pipe are engaged, it is closed.

[0005] Moreover, the end face section is prepared in USP5,573,535 (example 2 of precedence) possible [****] like the example 1 of precedence from the tip of the long and slender pipe connected with the control unit by the side of a hand, and this pipe, and the forceps which have the grasping member of the pair which has the relation from which each other was insulated, and a knife blade for cutting a body tissue open are shown. And with the forceps of this example 2 of precedence, the grasping member is connected to the tabular support arm in the condition of having been energized in the open direction.

[0006] Furthermore, the grasping member and support arm of a pair are arranged to the medial axis of a pipe at the position of symmetry, respectively. Furthermore, the blade of a knife is arranged possible [longitudinal slide movement] in the direction of a medial axis at the medial-axis top of a pipe.

[0007]

[Problem(s) to be Solved by the Invention] By the way, at the time of use of forceps, in order for a knife blade to cut open certainly the body tissue grasped between grasping members, it is necessary to grasp a body tissue by sufficient retention span. Since the force of holding down a body tissue between grasping members will become weak if the support arm connected to the grasping member is too soft at this time, sufficient retention span cannot be obtained.

[0008] Therefore, in case a body tissue is grasped between grasping members, in order to obtain

sufficient retention span, a section modulus with a as large support arm as possible is needed. Here, it becomes a hard spring, so that a section modulus is large.

[0009] However, since the knife rod of a knife blade is arranged between the support arms of a pair with the forceps of a configuration conventionally [as shown in the above-mentioned example of both precedence], the support arm and knife rod of a pair will arrange in the direction which intersects perpendicularly with the medial axis of a pipe, and will be arranged in it. Therefore, when the section modulus of each support arm is enlarged, in order to have to take into consideration interference with the knife rod for surgical operations, a big installation tooth space is needed in the side-by-side installation direction of the support arm of a pair, and a knife rod, and there is a problem to which the diameter of a pipe becomes comparatively large in it.

[0010] Thus, since it is necessary to make a big hole in order to insert these forceps in a patient's body wall, in case these forceps are inserted in a patient's inside of the body, when the diameter of a pipe is large, there is a problem to which the invasion to a patient becomes large. Therefore, since it is difficult to arrange a support arm with a large section modulus into a pipe with the forceps of a configuration conventionally when especially narrow diameter-ization of forceps is considered, a support arm with a comparatively small section modulus is used in many cases, and there is a problem which is easy to become the weak forceps of a retention span as a result.

[0011] This invention was made paying attention to the above-mentioned situation, and even if the purpose narrow-diameter-izes the insertion section inserted in the inside of the body, it can take the large section modulus of the support arm of a grasping member, and it is to offer the forceps which can obtain sufficient retention span.

[0012]

[Means for Solving the Problem] While the grasping member of the pair opened and closed to the point of the insertion section inserted in the inside of the body is arranged, this invention In forceps equipped with an incision means to extend possible [attitude actuation] and to operate independently with said grasping member to the point side of said insertion section They are the forceps characterized by having arranged said incision means to juxtaposition in the state of offset in the location from which it separated from the migration orbit of the support element of each of said grasping member at the time of the switching action between the grasping members of said pair. And by preventing that the migration orbit and incision means of a support element of each grasping member at the time of the switching action of the grasping member of the pair arranged at the point of the insertion section interfere, even if it narrow-diameter-izes the insertion section, as the large section modulus of each support arm of a grasping member can be taken, sufficient retention span is obtained between the grasping members of a pair.

[0013]

[Embodiment of the Invention] Hereafter, the gestalt of operation of the 1st of this invention is explained with reference to drawing 1 (A), (B), or drawing 10. Drawing 1 (A) shows the outline configuration of the bipolar forceps with incision function 1 whole of the gestalt of this operation.

[0014] As shown in the bipolar forceps 1 with an incision function of the gestalt of this operation at drawing 1 (A), it is arranged at the long and slender ****-like insertion section 2 inserted into a patient's coelome, and the point of this insertion section 2, and the treatment section 3 in which the RF energization for grasping and solidifying a body tissue within a coelome is possible, and the control unit 4 by the side of the hand connected with the end face section of the insertion section 2 are formed.

[0015] Furthermore, the handle unit 5 shown in the bipolar forceps 1 of the gestalt of this operation at the following three components (A), i.e., drawing 2, the forceps unit 6 shown in drawing 2 (B), and the knife unit 7 shown in drawing 2 (C) are formed. And these handle units 5, the forceps unit 6, and the knife unit 7 are attached removable, respectively, and these bipolar forceps 1 shown in drawing 1 (A) in the state of attachment are constituted.

[0016] Moreover, the grip section 11 and the actuation pipe 12 are formed in the handle unit 5. Here, the tip side extension section 13 which extended to the point side is formed in the upper

limit section in drawing 2 (A) at the grip section 11. The ring-like pipe electrode holder 14 is formed in the point of this tip side extension section 13. And the actuation pipe 12 is inserted in in this pipe electrode holder 14. Furthermore, the forceps unit 6 is inserted in in this actuation pipe 12.

[0017] Moreover, the knife unit connection 16 is arranged, respectively behind the forceps unit connection 15 for connecting with the back end section of the forceps unit 6 electrically and mechanically behind the tip side extension section 13 at the upper part of the grip section 11, and this forceps unit connection 15. And the lumen which contains the socket section 49 which the back end of the forceps unit 6 mentions later, and the connecting means which connects the socket section 49 of the forceps unit 6 contained by this lumen are prepared in the forceps unit connection 15.

[0018] furthermore — the actuation pipe 12 — fixed pipe 12a and this fixed pipe 12a — receiving — the direction of a medial axis of the insertion section 2 — meeting — a slide — movable movable pipe 12b is prepared. Here, the end face section of fixed pipe 12a is being fixed in the condition of having been inserted into the pipe electrode holder 14 as shown in drawing 8 (A). In addition, the back end section of movable pipe 12b extends to the rotatable knob 86 side mentioned later, and is being fixed to the rotation member 87 holding this rotatable knob 86.

[0019] Moreover, the trigger 17 for forceps actuation of a Uichi Hidari pair, the knife lever 18 for knife actuation, and the ratchet lever 19 mentioned later are formed in the grip section 11. Here, the trigger 17 for forceps actuation is arranged by the rotation member 87 of a rotatable knob 86, and the knife lever 18 for knife actuation is arranged in the knife unit connection 16, respectively.

[0020] Moreover, the trigger 17 is connected with the upper limit section of the grip section 11 free [rotation] centering on the rotation pin 20. Furthermore, upper part extension section 17a is installed in the upper part part of the rotation supporting point by the rotation pin 20 by this trigger 17. Besides, the installed long hole 21 which carries out an abbreviation rectangular cross to the direction of a medial axis of the insertion section 2 is formed in way extension section 17a. The engagement pin 22 is inserted in this long hole 21 from the outside. As shown in drawing 8 (A), guide member 22a for bearing is being fixed to the point of this engagement pin 22.

[0021] Moreover, ring-like slot 87a is formed in the peripheral face of the rotation member 87 of a rotatable knob 86. Into this ring-like slot 87a, guide member 22a of the engagement pin 22 is inserted. And the rotation member 87 of a rotatable knob 86 is supported pivotable in the direction of the circumference of a shaft of the forceps unit 6 in the condition that guide member 22a of each engagement pin 22 is guided along with ring-like slot 87a of the rotation member 87.

[0022] In addition, in the grip section 11, it energizes in the direction (it is the direction of a clockwise rotation centering on the rotation pin 20 in drawing 2 (A)) which separates this trigger 17 from the grip section 11, and the spring member which always holds this trigger 17 in the position in readiness (orientation) which is most distant from the grip section 11 as shown in drawing 2 (A) and which is not illustrated is arranged. And movable pipe 12b is moved forward with the actuation by which the trigger 17 whole rotates in the direction of a counterclockwise rotation centering on the rotation pin 20 as by resisting the spring force of this spring member in a trigger 17, drawing in the grip section 11 side, and operating it shows to drawing 1 (A), and upper part extension section of trigger 17 17a moves leftward in drawing 1 (A) at this time. Furthermore, in this condition, if a trigger 17 is released, this trigger 17 will return return and movable pipe 12b to the orientation shown in drawing 2 (B) according to the spring force of the spring member in the grip section 11 in the position in readiness behind original.

[0023] Moreover, the slide guide 23 protrudes on the back end section of the forceps unit connection 15 towards back. And the cable splicing section 24 is formed in the back end section of this slide guide 23.

[0024] Moreover, the knife lever 18 for knife actuation is arranged at the both sides of the grip section 11, and is connected with the grip section 11 free [rotation] centering on the rotation pin 25 like the trigger 17. Furthermore, before and after extending in the shape of abbreviation

for V characters above the rotation supporting point by the rotation pin 25, the two upper part extension sections 26 and 27 are formed in the knife lever 18. And in the upper part extension section 26 by the side of before, it was crooked towards the side of the grip section 11, and handles, and the long hole 29 is formed in the flexion 28 of business, and the upper part extension section 27 on the backside, respectively. In addition, the knife lever 18 is always held in the position in readiness shown in drawing 1 (A) by the spring member which is not illustrated. [0025] Moreover, the slider 30 arranged possible [sliding] to the slide guide 23 of the forceps unit connection 15 is formed in the knife unit connection 16. It engages with this slider 30 possible [engaging and releasing] with the knife unit stop means which the unit connection 64 which the back end section of the knife unit 7 which extended through the inside of the channel of the forceps unit 6 mentions later does not illustrate. Furthermore, the engagement pin 31 inserted in the long hole 29 of the knife lever 18 protrudes on the side face of the slider 30 of this knife unit connection 16.

[0026] Moreover, as shown in drawing 2 (B), the long and slender rod section 41 is formed in the forceps unit 6. The jaws (grasping member) 42a and 42b of the pair opened and closed and the support arms (support element) 43a and 43b which consist of an elastic member energized in the direction which makes these jaws 42a and 42b extend are formed in the point of this rod section 41.

[0027] Here, Jaws 42a and 42b are formed with the conductive metallic material (specifically SUS304- alloys for special springs, such as stainless steel lines for springs, such as WPB, piano wire, and a titanium alloy). And one jaw 42a is fixed to the point of support arm 43a, and jaw 42b of another side is being fixed to the point of support arm 43b, respectively.

[0028] Moreover, the abbreviation serrated knife-like organization grasping sides 45a and 45b in which two or more gear teeth 44a and 44b were continuously installed side by side along the direction of a medial axis of the insertion section 2 as shown in drawing 3 are formed in each opposed face between jaw 42a of the gestalt of this operation, and 42b. Here, the shape of toothing of each gear teeth 44a and 44b of Jaws 42a and 42b is formed as follows rather than is uniform. Namely, the 1st gear tooth 44a1 with dental irregularity small to the point of each jaws 42a and 42b and 44b1 Two or more side-by-side installation is carried out, and it is the 1st gear tooth 44a1 and 44b1 in the back end section of each jaws 42a and 42b. The 2nd gear tooth 44a2 with dental large irregularity, and 44b2 Two or more side-by-side installation is carried out. Therefore, as for the shape of toothing of the gear tooth of the gear teeth 44a and 44b of the organization grasping sides 45a and 45b of each jaws 42a and 42b of the gestalt of this operation, the direction of a point is small compared with the back end section. In addition, you may make it the configuration to which the configuration of gear teeth 44a and 44b becomes large gradually as it goes to a back end section side from the point side of each jaws 42a and 42b. Furthermore, as it indicates drawing 3 that an organization is not wounded, the crowning of each gear teeth 44a and 44b is that it is not sharp and flat, or roundish.

[0029] Moreover, for the point side of each support arms 43a and 43b of the gestalt of this operation, as shown in drawing 3 (B), a cross-section configuration is the circular shank 43a1 of a circle configuration, and 43b1. It is formed. Furthermore, the circular shank 43a1 of each support arms 43a and 43b and 43b1 The notch 43a2 which cut and lacked a part of peripheral face in the plane as shown in a back end side at drawing 3 (C), and 43b2 It is formed, respectively. Here, it is each notch 43a2 and 43b2. It is arranged at the opposed face side between each support arm 43a and 43b, respectively. Thereby, it is the circular shank 43a1 of each support arms 43a and 43b, and 43b1. It is set up so that a cross-section configuration may change from a back end side to a point side along the direction of an axial center. In addition, the circular shank 43a1 of each support arms 43a and 43b and 43b1 Each notch 43a2 which can be set, and 43b2 Die length is set up suitably if needed.

[0030] Moreover, the body of the rod section 41 is formed with the gestalt of plurality and this operation with the multi-lumen tube 44 equipped with three insertion holes 44a, 44b, and 44c, as shown in drawing 4 (A) and (B). This multi-lumen tube 44 is formed with insulating synthetic-resin ingredients (for example, Pori Sall John, PEEK, polyphenylene sulfide, polyether imide, etc.).

[0031] Furthermore, the rod part material 45a and 45b connected with the support arms 43a and 43b is inserted in two insertion holes 44a and 44b of the multi-lumen tube 44, and it is equipped, where a clearance is filled with adhesives or a filler so that there may be no penetration of a sordes etc. Here, each rod part material 45a and 45b is formed with rodding 46 and the insulating tube 47 which covers the peripheral face of this rodding 46. However, if the insulation of the multi-lumen tube 44 is enough, each rod part material 45a and 45b does not necessarily need to be covered by the insulating tube 47. In addition, the knife unit 7 is inserted in the remaining insertion hole 44c of the multi-lumen tube 44.

[0032] Moreover, the peripheral face of the multi-lumen tube 44 is equipped with the outer tube 48. Furthermore, the socket section 49 which consists of a synthetic-resin ingredient which is an insulating material is arranged in the back end section of this multi-lumen tube 44.

[0033] As shown in drawing 4 (C), two cavities 49a and 49b and one insertion hole 49c are formed in this socket section 49. Here, two cavities 49a and 49b of this socket section 49 are opened for free passage by two insertion holes 44a and 44b of the multi-lumen tube 44, respectively. Furthermore, insertion hole 49c of the socket section 49 is opened for free passage by insertion hole 44c of the multi-lumen tube 44, and the knife unit 7 is inserted in.

[0034] Moreover, the back end section of the rod part material 45a and 45b is inserted in each cavities 49a and 49b, respectively. Here, as shown in drawing 4 (A), the outcrop of the rodding 46 with which the insulating tube 47 is not covered is formed in the back end section of the rod part material 45a and 45b, and the tubular electrode 50 formed in the outcrop of this rodding 46 with electrical conducting materials, such as a metal, is being fixed.

[0035] Furthermore, some tubular electrodes 50 of the back end section of the rod part material 45a and 45b are arranged in the exterior side by each opening of two cavities 49a and 49b of the socket section 49 by the exposure. And the forceps unit connection 15 of the handle unit 5 and the electrical connection 51 for RF energization which performs electrical installation are formed of the exposed part of this two tubular electrode 50. Two electric contact (exposed part of the tubular electrode 50) of this electrical connection 51 is connected to the jaws 42a and 42b of the treatment section 3 through rodding 46 and the support arms 43a and 43b of each rod part material 45a and 45b, respectively.

[0036] Moreover, the receptacle member 53 which consists of a synthetic-resin ingredient which is an insulating material equipped with receipt crevice 53a which contains the socket section 49 of the back end of the forceps unit 6 as shown in drawing 5 (A) and (B) is formed in the forceps unit connection 15 of the handle unit 5. The connectable connection electrode 54 of the shape of flat spring of a pair is electrically formed in the tubular electrode 50 of the socket section 49 of the forceps unit 6 at receipt crevice 53a of this receptacle member 53. the direction which intersects perpendicularly with the shaft orientations of the rod section 41 of the forceps unit 6 as these connection electrodes 54 are shown in drawing 5 (A) — alienation — opposite arrangement is carried out.

[0037] And where the socket section 49 of the back end of the forceps unit 6 is inserted into receipt crevice 53a of the receptacle member 53, as shown in drawing 5 (B), the pressure welding of these connection electrodes 54 is carried out to two tubular electrodes 50 of the socket section 49 from both sides, respectively, and between two tubular electrodes 50 of the socket section 49 and connection electrodes 54 is electrically connected to them.

[0038] In addition, in order that the tubular electrode 50 of the forceps unit 6 and the connection electrode 54 of the forceps unit connection 15 may prevent the electric resistance rise at the time of attachment and detachment depended for the ability deleting while lowering the electric resistance at the time of both connection, surface treatment, such as gold plate and nickel chromium plating, is performed to the front face.

[0039] Furthermore, it is equipped with the covering member 55 which receives in the forceps unit connection 15 of the handle unit 5, and consists receipt crevice 53a of a member 53 of a synthetic-resin ingredient which is a wrap insulating material. And popularity is won with this covering member 55, and is won between members 53, and receipt crevice 53a of a member 53 is blockaded in the state of sealing.

[0040] Moreover, with the gestalt of this operation, at the time of attachment by the handle unit

5 and the forceps unit 6, the forceps unit 6 is inserted in the actuation pipe 12 of the handle unit 5, and the electrical connection 51 of the forceps unit 6 is connected with the forceps unit connection 15 of the handle unit 5 possible [engaging and releasing].

[0041] Here, when a trigger 17 is held in the position in readiness shown in drawing 2 (A) according to the spring force of the spring member in the grip section 11 and movable pipe 12b is held in the back position in readiness, the jaws 42a and 42b of the forceps unit 6 are held in the condition of having been extended as the spring force of the support arms 43a and 43b showed to drawing 1 (B).

[0042] Furthermore, in the state of this standby As the spring force of the spring member in the grip section 11 is resisted and a trigger 17 is shown in drawing 1 (A) When movable pipe 12b of the actuation pipe 12 is moved forward along with the medial axis of the actuation pipe 12 with the rotation actuation rotated in the direction of a counterclockwise rotation centering on the rotation pin 20 from a position in readiness It is closed, as the jaws 42a and 42b of the forceps unit 6 resist the spring force of the support arms 43a and 43b with advance actuation of this movable pipe 12b and it is shown in drawing 1 (A). Therefore, switching operation of the jaws 42a and 42b of the forceps unit 6 can be carried out now by operating a trigger 17 and moving movable pipe 12b of the actuation pipe 12 in the direction of a medial axis of the actuation pipe 12.

[0043] Moreover, as shown in drawing 2 (C), the long and slender knife rod 61 is formed in the knife unit 7. The knife (incision means) 62 is formed in the point of this knife rod 61.

[0044] The end cutting part 63 for cutting a body tissue open is arranged by the point of this knife 62. This end cutting part 63 is formed in the condition of having inclined aslant to the direction of a center line of the knife rod 61.

[0045] Furthermore, junction immobilization of the point of the knife rod 61 is carried out at the back end section of a knife 62. The unit connection 64 connected to the knife unit connection 16 of the handle unit 5 is formed in the back end section of this knife rod 61.

[0046] Moreover, the knife unit 7 of the gestalt of this operation is attached to the attachment object of the handle unit 5 and the forceps unit 6. After the knife unit 7 is inserted in insertion hole 44c of the rod section 41 in the forceps unit 6 at the time of the attachment activity of this knife unit 7, from insertion hole 44c of the socket section 49, the back end section of this knife unit 7 is pulled out back, and is connected with the knife unit connection 16 of the grip section 11 possible [engaging and releasing]. And this knife unit 7 operates independently in the jaws 42a and 42b of the forceps unit 6 with actuation of the knife lever 18 for knife actuation.

[0047] Here, at the time of actuation of the knife lever 18, the knife lever 18 rotates in the direction of a counterclockwise rotation centering on the rotation pin 25 in drawing 1 (A), a slider 30 is moved forward with rotation actuation of this knife lever 18, and extrusion actuation of the knife unit 7 is carried out ahead.

[0048] Moreover, with the gestalt of this operation, as shown in drawing 6, the knife 62 of the knife unit 7 is arranged in the state of offset in the location from which it separated from the migration orbit between support arm 43a at the time of closing motion of the jaws 42a and 42b of a pair, and 43b at juxtaposition. In this case, the notching-like interior 65 of a proposal to which it shows migration of each support arms 43a and 43b of the forceps unit 6 at the time of closing motion of Jaws 42a and 42b is established in movable pipe 12b of the actuation pipe 12.

[0049] Furthermore, the slit (guide means) 52 which guides attitude actuation of a knife 62 at the time of actuation of the knife unit 7 as shown in drawing 7 (A) and (B) is formed in the interior of each jaws 42a and 42b of the forceps unit 6. And at the time of actuation of the knife unit 7, attitude actuation of the knife 62 is carried out in the direction of a medial axis of the knife unit 7 along with the slit 52 of each jaws 42a and 42b of the forceps unit 6.

[0050] Moreover, at this time, the tip side of Jaws 42a and 42b serves as equal width of face focusing on the slit 52, and has constituted the configuration of right-and-left asymmetry as the whole. This decreases the whole organization touch area by considering as necessary minimum width of face carrying out hemostasis of the both sides of a slit 52, and raises current density, and it aims at solidifying an organization efficiently.

[0051] Moreover, it cuts to the point of a knife 62, a cutting part 63 is protected and dashed, and

the section (end cutting part safeguard) 66 is formed. When [this] it dashes and a knife 62 moves forward along with the slit 52 of Jaws 42a and 42b, the section 66 in the front end section of the slit 52 of each jaws 42a and 42b by [this] dashing and making the section 66 contact It prevents and cuts that the cutting-edge attachment section of the end cutting part 63 of this knife 62 contacts the front end section of the slit 52 of each jaws 42a and 42b directly, and a cutting part 63 is protected.

[0052] Moreover, the rotation drive 56 which shows the forceps unit 6 in the direction of the circumference of a shaft of the rod section 41 at drawing 8 (A) which carries out a rotation drive is formed at the bipolar forceps 1 of the gestalt of this operation by making the medial axis of movable pipe 12b into the center of rotation. This rotation drive 56 is constituted as follows.

[0053] That is, the support arm 57 of a Uichi Hidari pair protrudes on the abbreviation mid gear of a cross direction upward in the upper part of the grip section 11 of the handle unit 5. The guide member 58 for bearing protrudes on each support arm 57 towards inboard.

[0054] Furthermore, the ring-like slot 59 is formed in the front end section peripheral face of the forceps unit connection 15. Into this ring-like slot 59, the guide member 58 of each support arm 57 is inserted. And the forceps unit connection 15 is supported pivotable in the direction of the circumference of a shaft of the rod section 41 of the forceps unit 6 in the condition that the guide member 58 of each support arm 57 is guided along the ring-like slot 59 of the forceps unit connection 15.

[0055] Furthermore, two guides rod fixed hole 15a is formed in the front end side of the forceps unit connection 15. Such guide rod fixed hole 15a is arranged at the both sides of the insertion hole of the forceps unit 6 formed in the axial center section of the forceps unit connection 15.

[0056] Moreover, holddown-member 14a fixed to the point of the tip side extension section 13 of the handle unit 5 as shown in the pipe electrode holder 14 at drawing 8 (B) is prepared. Circular hole 14b is formed in the back end side of this holddown-member 14a.

[0057] Furthermore, cylinder-like bearing member 14c is being fixed to the axial center section of circular hole 14b of the pipe electrode holder 14. The ring-like guide supporter material 88 is inserted between circular hole 14b of this pipe electrode holder 14, and bearing member 14c. And this guide supporter material 88 is supported pivotable in the direction of the circumference of a shaft of the rod section 41 of the forceps unit 6.

[0058] Moreover, two guides rod fixed hole 88a is formed in the back end side of the guide supporter material 88. Such guide rod fixed hole 88a is arranged at the both sides of the insertion hole of the forceps unit 6 formed in the axial center section of the guide supporter material 88. Furthermore, to the peripheral face of this guide supporter material 88, two or more slot 88b is prepared, and washes, and it is easy intermediary ****.

[0059] Moreover, between the pipe electrode holder 14 and the forceps unit connection 15, two guide rods 89 arranged in parallel are constructed. Here, the point of two guide rods 89 is being fixed in the condition of having been inserted into [of two of the guide supporter material 88 of the pipe electrode holder 14] guide rod fixed hole 88a. Furthermore, the back end section of two guide rods 89 is being fixed in the condition of having been inserted into [of two of the forceps unit connections 15] guide rod fixed hole 15a.

[0060] moreover, the rotatable knob 86 for actuation of the rotation drive 56 — between the front pipe electrode holder 14 and the back forceps unit connections 15 — and the trigger 17 — it is arranged mostly right above. And when a user grasps the handle unit 5, the rotatable knob 86 is arranged in the location which the same finger (index finger) as the digiti manus which operates a trigger 17 reaches.

[0061] Furthermore, the rotatable knob 86 is being fixed to the front end section of the rotation member 87. Two guides rod insertion hole 87b is formed in this rotation member 87. And in such guide rod insertion hole 87b, two guide rods 89 have penetrated respectively free [a slide].

[0062] And the rotation drive of the two guide rods 89 is carried out through the rotation member 87 rotated to this rotatable knob 86 and one at the time of rotation actuation of a rotatable knob 86 in the direction of the circumference of a shaft of the rod section 41 of the forceps unit 6 by making the medial axis of movable pipe 12b into the center of rotation.

Furthermore, the rotation drive of the forceps unit connection 15 is carried out with two guide

rods 89 in the direction of the circumference of a shaft of the rod section 41 of the forceps unit 6. Thereby, the rotation drive of the forceps unit 6 whole is carried out with the forceps unit connection 15 in the direction of the circumference of a shaft of the rod section 41 of the forceps unit 6.

[0063] Moreover, the returning-water hole 90 is formed in holddown-member 14a of the pipe electrode holder 14, and bearing member 14c. The toe of this returning-water hole 90 is opened for free passage by the aqueduct formed between fixed pipe 12a and movable pipe 12b. And from this returning-water hole 90, water can be returned to the aqueduct between fixed pipe 12a and movable pipe 12b, and it can wash.

[0064] In addition, the stopper member 131 for fixing the forceps unit 6 is formed in the forceps unit connection 15. Engagement section 131a which engages with notch 41a formed in the peripheral face of the rod section 41 of the forceps unit 6 is formed in this stopper member 131. And this stopper member 131 is energized by the flat spring member 132 in the direction in which engagement section 131a engages with notch 41a of the rod section 41.

[0065] Although engagement to the stopper member 131 may perform positioning of the circumferential direction of the forceps unit 6, you may make it the stopper member 131 engage with the slot (not shown) which prepared independently the engagement pin which is not illustrated to the forceps unit connection 15, and prepared this engagement pin in the forceps unit 6.

[0066] Moreover, in case the interior of the grip section 11 is made to rotate a trigger 17 and switching operation of each jaws 42a and 42b of the treatment section 3 is performed Only a motion in the handle close direction (direction which rotates a trigger 17 in the direction of a counterclockwise rotation centering on the rotation pin 20 in drawing 2 (A)) which closes a trigger 17 to this grip section 11 is allowed. The ratchet mechanism 71 of a stepless type as shows a motion of a trigger 17 in the direction of a handle aperture (direction which rotates a trigger 17 in the direction of a clockwise rotation centering on the rotation pin 20 in drawing 2 (A)) which opens a trigger 17 to the grip section 11 to drawing 9 fixed to a stepless story is established. The ratchet mechanism 71 of this stepless type is constituted as follows.

[0067] That is, as shown in drawing 9, margo-inferior radii section 17a of an approximate circle arc configuration is formed in the margo-inferior section of a trigger 17. The radii of this margo-inferior radii section 17a are formed in the shape of an approximately concentric circle in accordance with the rotation orbit of a trigger 17.

[0068] Moreover, the wearing hole 72 of a trigger 17 is formed in the upper part of the grip section 11 at the rotation pin 20 bottom. furthermore — the margo-inferior section of this trigger wearing hole 72 — margo-inferior radii section 17a of a trigger 17, and alienation — the inclined plane 73 by which opposite arrangement is carried out is formed. This inclined plane 73 is set up so that it may become small gradually, as the clearance between margo-inferior radii section 17a of a trigger 17 goes ahead. In addition, the extension include angle alpha between margo-inferior radii section 17a of a trigger 17 and the inclined plane 73 of the grip section 11 is set as the proper acute angle include angle.

[0069] Furthermore, the lock arm 74 of the letter of the abbreviation for L characters is formed in the interior of the grip section 11. The end section of this lock arm 74 is attached in the tooth-back plate of the grip section 11 rotatable through the rotation supporting point 75.

[0070] Moreover, before side extension section 74a, backside extension section 74b, and spring receptacle section 74c projected towards back are prepared in free one end of the other end of the lock arm 74. Here, the wedge member 76 inserted possible [insertion and detachment] is formed at before side extension section 74a between margo-inferior radii section 17a of a trigger 17, and the inclined plane 73 of the trigger wearing hole 72. The rust pipe 78 is formed in this wedge member 76 please support to revolve free [rotation] to the pivot 77 fixed to before [the lock arm 74] side extension section 74a. Furthermore, engagement slot 79a for a lock and heights 79b for an engagement guide are formed in backside extension section 74b of the lock arm 74.

[0071] Moreover, the end section of the flat spring member 80 of the letter of the abbreviation for U characters is attached in the tooth-back plate of the grip section 11. The free edge of this

flat spring member 80 is contacted by spring receptacle section 74c of the lock arm 74. And free one end of the lock arm 74 is energized in the direction pressed forward by this flat spring member 80.

[0072] Moreover, in case a trigger 17 is rotated and switching operation of each jaws 42a and 42b of the treatment section 3 is performed, the ratchet mechanism 71 of a stepless type operates as follows. That is, free one end of the lock arm 74 is pressed forward by the spring force of the flat spring member 80, and where the rust pipe 78 which goes away wedge member 76 is inserted between margo-inferior radii section 17a of a trigger 17, and the inclined plane 73 of the trigger wearing hole 72, it is always held. And the thrust of the direction which extrudes a trigger 17 rightward in drawing 8 to the rust pipe 78 which leaves a trigger 17 wedge member 76 during the actuation moved in the handle close direction which is most distant from the grip section 11 as shown in drawing 2 (A) from a position in readiness is applied to the grip section 11. Therefore, in this condition, it is held in the state of discharge of friction engagement between each plane of composition of the rust pipe 78 which goes away wedge member 76, margo-inferior radii section 17a of a trigger 17, and the inclined plane 73 of the trigger wearing hole 72, and a trigger 17 can be freely moved in the handle close direction.

[0073] Here, when a trigger 17 rotates in the handle open direction conversely, the force of the direction drawn leftward is applied to the rust pipe 78 which leaves a trigger 17 wedge member 76 in drawing 9. Therefore, since friction engagement of the rust pipe 78 which goes away wedge member 76 in this condition is carried out between each plane of composition of margo-inferior radii section 17a of a trigger 17, and the inclined plane 73 of the trigger wearing hole 72, it is prevented that a trigger 17 rotates in the handle open direction, and a motion of the trigger 17 at this time is fixed. In addition, immobilization of a motion in the direction which a trigger 17 rotates in the handle open direction is performed on a stepless story.

[0074] Moreover, the ratchet lever 19 which carries out change actuation is formed in the ON state held in the condition with the effective function of a ratchet mechanism 71 to the bipolar forceps 1 of the gestalt of this operation, and the OFF state which makes the function of a ratchet mechanism 71 an invalid. The end face section of this ratchet lever 19 is attached in the external surface of the side plate of the grip section 11 rotatable through the pivot 81. Here, the ratchet lever 19 is rotated between the on position shown as a continuous line in drawing 1 (A), and the off position shown by the imaginary line all over this drawing.

[0075] Furthermore, the end section of the actuation plate 82 for lock discharge is being fixed to the toe of a pivot 81. The engagement pin 83 engaged possible [engaging and releasing to engagement slot 79a of the lock arm 74] is being fixed to the other end of this actuation plate 82.

[0076] And when the ratchet lever 19 is held by the on position shown as a continuous line in drawing 1 (A), as shown in drawing 9, the engagement pin 83 of the actuation plate 82 is held in the engagement discharge location from which it separated from engagement slot 79a of the lock arm 74. In this case, according to the spring force of the flat spring member 80, it is held where the rust pipe 78 which goes away wedge member 76 is inserted between margo-inferior radii section 17a of a trigger 17, and the inclined plane 73 of the trigger wearing hole 72, and the function of a ratchet mechanism 71 is held by the effective ON state.

[0077] Moreover, when the ratchet lever 19 rotates to the off position shown by the imaginary line in drawing 1 (A), as shown in drawing 10, the engagement pin 83 of the actuation plate 82 is guided to heights 79b for an engagement guide, and engages with engagement slot 79a of the lock arm 74. At this time, the lock arm 74 is switched to the OFF state which it rotates in the direction of a clockwise rotation in drawing 10, and the rust pipe 78 which goes away wedge member 76 is drawn out from between margo-inferior radii section 17a of a trigger 17, and the inclined planes 73 of the trigger wearing hole 72, and makes the function of a ratchet mechanism 71 an invalid against the spring force of the flat spring member 80.

[0078] Next, an operation of the above-mentioned configuration is explained. The bipolar forceps 1 of the gestalt of this operation are used where the handle unit 5, the forceps unit 6, and the knife unit 7 are attached in one, as shown in drawing 1 (A).

[0079] And in an initial state, the trigger 17 of a control unit 4 is held in the position in readiness

most distant from the grip section 11, as shown in drawing 2 (A), and movable pipe 12b of the actuation pipe 12 is held in the last end position of the successive range of the direction of a medial axis of the insertion section 2. Furthermore, the ratchet lever 19 is held by the on position shown as a continuous line in drawing 1 (A), and the engagement pin 83 of the actuation plate 82 is held in the engagement discharge location from which it separated from engagement slot 79a of the lock arm 74 as shown in drawing 9.

[0080] In this condition, as shown in drawing 2 (B), support arm 43a of the pair of the treatment section 3 and the whole 43b are projected to the exterior of movable pipe 12b of the actuation pipe 12, and it is held in the state of open between [of two] jaw 42a and 42b. Furthermore, the ratchet mechanism 71 of a stepless type is held in the engagement discharge location from which the engagement pin 83 of the actuation plate 82 separated from engagement slot 79a of the lock arm 74, as shown in drawing 9, and the rust pipe 78 which goes away wedge member 76 according to the spring force of the flat spring member 80 is inserted between margo-inferior radii section 17a of a trigger 17, and the inclined plane 73 of the trigger wearing hole 72, and it is held by the ON state with the effective function of a ratchet mechanism 71.

[0081] Moreover, the jaws 42a and 42b of the treatment section 3 are closed-operated as follows by drawing and operating a trigger 17 to the grip section 11 side at the time of use of the bipolar forceps 1. That is, movable pipe 12b of the actuation pipe 12 moves to the shaft-orientations front with the actuation which rotates a trigger 17 in the direction of a counterclockwise rotation (the handle close direction) centering on the rotation pin 20 in drawing 1 (A). The support arms 43a and 43b of the forceps unit 6 are gradually drawn in the interior of movable pipe 12b from a back end side with advance actuation of this movable pipe 12b. And since support arm 43a of the forceps unit 6 and the whole 43b will be drawn in the interior of movable pipe 12b if movable pipe 12b moves forward to the latest location of the successive range of the direction of a medial axis of the insertion section 2, as shown in drawing 1 (A), it is closed between jaw 42a of the forceps unit 6, and 42b.

[0082] Moreover, when the operating physical force of the direction (the handle close direction) which draws a trigger 17 in the grip section 11 side, and operates it acts on a trigger 17, the thrust of the direction extruded rightward in drawing 9 is applied to the rust pipe 78 which leaves a trigger 17 wedge member 76. Therefore, in this condition, it is held in the state of discharge of friction engagement between each plane of composition of the rust pipe 78 which goes away wedge member 76, margo-inferior radii section 17a of a trigger 17, and the inclined plane 73 of the trigger wearing hole 72, and a trigger 17 can be freely moved in the handle close direction.

[0083] Here, when a trigger 17 rotates in the handle open direction conversely, the force of the direction drawn leftward is applied to the rust pipe 78 which leaves a trigger 17 wedge member 76 in drawing 9. Therefore, since friction engagement of the rust pipe 78 which goes away wedge member 76 in this condition is carried out between each plane of composition of margo-inferior radii section 17a of a trigger 17, and the inclined plane 73 of the trigger wearing hole 72, it is prevented that a trigger 17 rotates in the handle open direction, and a motion of the trigger 17 at this time is fixed.

[0084] Therefore, since this trigger 17 is held in the condition of not moving to an opposite direction, according to a ratchet mechanism 71 during actuation of drawing a trigger 17 in the grip section 11 side, and operating it, as shown in drawing 1 (A), when between jaw 42a of the forceps unit 6 and 42b is closed, the closed state between this jaw 42a and 42b is maintained.

[0085] Moreover, between jaw 42a of the forceps unit 6 and 42b is closed, and in the condition that the closed state between jaw 42a and 42b is maintained according to the ratchet mechanism 71, when rotating the off position which shows the ratchet lever 19 by the imaginary line in drawing 1 (A), as shown in drawing 10, the engagement pin 83 of the actuation plate 82 is guided to heights 79b for an engagement guide, and engages with engagement slot 79a of the lock arm 74. At this time, it is switched to the OFF state to which it rotates in the direction of a clockwise rotation in drawing 9, the rust pipe 78 which goes away wedge member 76 is compulsorily drawn out from between margo-inferior radii section 17a of a trigger 17, and the inclined planes 73 of the trigger wearing hole 72, and the lock arm 74 makes the function of a ratchet mechanism 71 an invalid against the spring force of the flat spring member 80.

[0086] Therefore, in this condition, without carrying out discharge actuation by the ratchet lever 19, a trigger 17 can move a trigger 17 to the closed actuation direction and opposite direction of Jaws 42a and 42b, can open between jaw 42a and 42b, and can carry out the switching action of between jaw 42a and 42b freely.

[0087] Furthermore, Jaws 42a and 42b are opened [when a trigger 17 is operated and movable pipe 12b is made to move as mentioned above] with the gestalt of this operation, and closed to a handle with an orientation. Although the force takes also in the vertical direction to a rotatable knob 86 at this time, since there is a guide rod 89, a rotatable knob 86 moves horizontally, without moving to the upper and lower sides.

[0088] Moreover, if a rotatable knob 86 is rotated, turning effort will be transmitted in order of the guide rod 89, the forceps unit connection 15, the forceps unit 6, and Jaws 42a and 42b. And the rotation drive of the two guide rods 89 is carried out through the rotation member 87 rotated to this rotatable knob 86 and one in the direction of the circumference of a shaft of the rod section 41 of the forceps unit 6 by making the medial axis of movable pipe 12b into the center of rotation. Furthermore, the rotation drive of the forceps unit connection 15 is carried out with two guide rods 89 in the direction of the circumference of a shaft of the rod section 41 of the forceps unit 6. Thereby, the rotation drive of the forceps unit 6 whole is carried out with the forceps unit connection 15 in the direction of the circumference of a shaft of the rod section 41 of the forceps unit 6. At this time, the forceps unit 6 and movable pipe 12b rotate to coincidence.

[0089] Moreover, where a body tissue is grasped between jaw 42a and 42b, coagulation treatment of the body tissue between jaw 42a and 42b is performed by the gestalt of this operation by supplying high-frequency power between jaw 42a and 42b.

[0090] Furthermore, after solidifying the body tissue between jaw 42a and 42b, the knife unit 7 drives by actuation of the knife lever 18. At the time of actuation of this lever 18, rotation actuation of the lever 18 is carried out in the direction of a counterclockwise rotation in drawing 1 a core [the rotation pin 25]. At this time, the slider 30 of the knife unit connection 16 goes to the shaft-orientations front of the insertion section 2 with the actuation which a lever 18 rotates, and the knife unit 7 whole moves to the front together with this slider 30. Thereby, the knife 62 of the knife unit 7 moves forward along with the slit 52 of each jaws 42a and 42b, and the coagulation part of a body tissue is cut open by the end cutting part 63 of this knife 62.

[0091] Furthermore, if the advance working of this knife unit 7 and the knife unit 7 move to forefront end position, a knife 62 will dash and the section 66 will be contacted by the front end section of the slit 52 of each jaws 42a and 42b. Since it is prevented by this that the cutting-edge attachment section of the end cutting part 63 of a knife 62 contacts the front end section of the slit 52 of each jaws 42a and 42b directly, the end cutting part 63 is protected.

[0092] Moreover, the knife lever 18 is released after incision of a body tissue. At this time, a lever 18 is rotated in the direction of an initial valve position according to the spring force of the spring member which is not illustrated, and the knife unit 7 whole is moved to a hand side together with the knife unit connection 16. Therefore, the knife 62 of the knife unit 7 is drawn in the interior of the actuation pipe 12, and is contained.

[0093] moreover — the gestalt of this operation — the 1st gear tooth 44a1 with dental irregularity small to the point of each jaws 42a and 42b, and 44b1 two or more side-by-side installation is carried out — having — the back end section of each jaws 42a and 42b — the 1st gear tooth 44a1 and 44b1 The 2nd gear tooth 44a2 with dental large irregularity, and 44b2 Two or more side-by-side installation is carried out. In this case, the 2nd gear tooth 44a2 with dental large irregularity and 44b2 In a part, since the amount which bites a body tissue is also large when a body tissue is grasped between each jaw 42a and 42b, a strong retention span is obtained. Moreover, the 1st gear tooth 44a1 with dental small irregularity and 44b1 In a part, the focus of a thin thing, especially a wall surface can be gathered, and delicate treatment can be performed. Therefore, the 1st gear tooth 44a1 with the small irregularity of the gear tooth of the point of the organization grasping sides 45a and 45b of each jaws 42a and 42b and 44b1 Delicate treatment is performed. Moreover, when you need incision, it is the 1st gear tooth 44a1 and 44b1. The 2nd gear tooth 44a2 with the large magnitude of dental irregularity, and 44b2 A body

tissue can be grasped strongly enough in a part.

[0094] Then, the following effectiveness is done so if it is in the thing of the above-mentioned configuration. Namely, since the knife 62 of the knife unit 7 is arranged in the state of offset in the location from which it separated from the migration orbit between support arm 43a at the time of closing motion of the jaws 42a and 42b of a pair, and 43b at juxtaposition as the gestalt of this operation shows to drawing 5 It can prevent that the migration orbit of the support arms 43a and 43b of each jaws 42a and 42b and the knife 62 of the knife unit 7 interfere at the time of the switching action of Jaws 42a and 42b. Therefore, since the large section modulus of the support arms 43a and 43b of each jaws 42a and 42b can be taken compared with the former even if it narrow-diameter-izes the insertion section 2, the rigidity of the support arms 43a and 43b of each jaws 42a and 42b can be raised, and sufficient retention span can be obtained between jaw 42a of a pair, and 42b. Similarly it can prevent that the diameter of a rod of the knife rod 61 becomes small, and the rigidity of the knife rod 61 can also be raised.

[0095] Furthermore, with the gestalt of this operation, the notching-like interior 65 of a proposal is established in movable pipe 12b of the actuation pipe 12. Working [by which the support arms 43a and 43b of the forceps unit 6 are gradually drawn in the interior of movable pipe 12b from a back end side with advance actuation of movable pipe 12b at the time of closing motion of Jaws 42a and 42b], He is trying to guide migration of each support arms 43a and 43b of the forceps unit 6 inside [65] the proposal of movable pipe 12b. Therefore, working [by which the support arms 43a and 43b of the forceps unit 6 are gradually drawn in the interior of movable pipe 12b with advance actuation of movable pipe 12b], Since it can prevent moving in the direction from which the support arms 43a and 43b of the forceps unit 6 separate from the direction regulated inside [65] the proposal of movable pipe 12b It can prevent certainly that prevent that each support arms 43a and 43b of the forceps unit 6 come together in the direction of a medial axis of movable pipe 12b, and the migration orbit of the support arms 43a and 43b of each jaws 42a and 42b and the knife 62 of the knife unit 7 interfere in it.

[0096] Moreover, with the gestalt of this operation, the body of the rod section 41 of the forceps unit 6 is formed with the insulating multi-lumen tube 44. While equipping two insertion holes 44a and 44b of the multi-lumen tube 44 with the rod part material 45a and 45b connected with the support arms 43a and 43b in the state of insertion Since it was made to make the knife unit 7 insert in the remaining insertion hole 44c, the electric discontinuous construction in the rod section 41 of the forceps unit 6 can be simplified. Therefore, the internal structure of the rod section 41 of the forceps unit 6 can be simplified, the outer-diameter dimension of the rod section 41 of the forceps unit 6 can be made comparatively small, and the rod section 41 of the forceps unit 6 can be narrow-diameter-ized. Consequently, there is effectiveness which can make small magnitude of the insertion hole of these bipolar forceps 1 formed in a patient's body wall at the time of use of the bipolar forceps 1, and can lessen invasion to a patient's body wall.

[0097] Moreover, at the gestalt of this operation, it is the circular shank 43a1 of each support arms 43a and 43b, and 43b1. Since the notch 43a2 which cut and lacked a part of peripheral face in the back end side at the plane, and 43b2 were formed The circular shank 43a1 of each support arms 43a and 43b, and 43b1 A cross-section configuration can be changed from a back end side to a point side along the direction of an axial center, and the spring property of each support arms 43a and 43b can be changed between the point side of each support arms 43a and 43b, and a back end side. And the section modulus by the side of the back end of each support arms 43a and 43b is small, and he is trying for the section modulus by the side of a point to become large with the gestalt of this operation.

[0098] Therefore, since the section modulus of each support arms 43a and 43b is small in the hand side of each support arms 43a and 43b and the spring is soft, the switching action of each support arms 43a and 43b of the forceps unit 6 can be performed smoothly. Furthermore, since the section modulus by the side of the tip of each support arms 43a and 43b is large, when a body tissue is grasped between jaw 42a and 42b, a strong retention span is obtained. Consequently, with the gestalt of this operation, while being able to perform smoothly the switching action of each support arms 43a and 43b of the forceps unit 6, when a body tissue is grasped between jaw 42a and 42b, it is effective in a strong retention span being obtained.

[0099] moreover, the direction which intersects two connection electrodes 54 perpendicularly with the shaft orientations of the rod section 41 of the forceps unit 6 with the gestalt of this operation at the forceps unit connection 15 of the handle unit 5 — alienation — since it prepared in juxtaposition where opposite arrangement is carried out, it becomes unnecessary to arrange an insulating member to a serial like [in the case of having arranged two connection electrodes to the serial at shaft orientations]. Therefore, since the structure of the electrical connection 51 between the handle unit 5 and the forceps unit 6 can be simplified, while being able to carry out [narrow diameter]-izing of the forceps unit 6, the electrical connection 51 between the handle unit 5 and the forceps unit 6 can be shortened. That is, there is effectiveness which can make the whole handle small.

[0100] Moreover, with the gestalt of this operation, since it opens and closes while Jaws 42a and 42b have been orientations, it is easy to operate it by the trigger 17 of a revolution type. Furthermore, although the force is applied also in the vertical direction to a rotatable knob 86 at the time of actuation of a trigger 17, since there is a guide rod 89, a rotatable knob 86 can be moved horizontally, without moving to the upper and lower sides. Therefore, the force of bending is not applied to movable pipe 12b of the actuation pipe 12, but deformation can be prevented, and the outer diameter of the forceps unit 6 can be made small.

[0101] Moreover, since it is exposed out of the handle, it is easy to wash the guide rod 89. Furthermore, the finger (index finger) as the *digiti manus* which operates a trigger 17 when a user grasps the grip section 11 of the handle unit 5, since [of a trigger 17] it is right above mostly with the same rotatable knob 86 reaches a rotatable knob 86. Therefore, since a rotatable knob 86 is operated in the condition [having grasped the grip section 11 of a handle single hand] and the forceps unit 6 can be rotated, operability is good.

[0102] Moreover, since the forceps unit 6 and movable pipe 12b rotate to coincidence at the time of actuation of a rotatable knob 86, the friction reduction at the time of rotation actuation of the forceps unit 6 is possible. Furthermore, while means, such as a projection, are unnecessary to the forceps unit 6 and being able to simplify structure, there is effectiveness which can carry out [narrow diameter]-izing.

[0103] Moreover, drawing 11 shows the gestalt of operation of the 2nd of this invention. As shown in drawing 11, the gestalt of this operation is replaced with movable pipe 12b of the actuation pipe 12 inside [65] the proposal of the shape of notching of the gestalt of the 1st operation, forms the cavity-like guide slot 85, and it makes it the configuration which shows migration of each support arms 43a and 43b of the forceps unit 6 in this guide slot 85 at the time of closing motion of Jaws 42a and 42b.

[0104] Then, if it is in the thing of the above-mentioned configuration, migration of each support arms 43a and 43b of working [by which the support arms 43a and 43b of the forceps unit 6 are gradually drawn in the interior of movable pipe 12b from a back end side with advance actuation of movable pipe 12b at the time of closing motion of Jaws 42a and 42b], and the forceps unit 6 can be guided in the guide slot 85 of movable pipe 12b. Therefore, working [by which the support arms 43a and 43b of the forceps unit 6 are gradually drawn in the interior of movable pipe 12b with advance actuation of movable pipe 12b], Since it can prevent moving in the direction from which the support arms 43a and 43b of the forceps unit 6 separate from the direction regulated in the guide slot 85 of movable pipe 12b It prevents that each support arms 43a and 43b of the forceps unit 6 come together in the direction of a medial axis of movable pipe 12b like the gestalt of the 1st operation. It can prevent certainly that the migration orbit of the support arms 43a and 43b of each jaws 42a and 42b and the knife 62 of the knife unit 7 interfere.

[0105] In addition, it may replace with the interior 65 (refer to drawing 5) of a proposal of the shape of notching of the gestalt of the 1st operation, and the guide slot 85 (refer to drawing 5) of the gestalt of the 2nd operation, the heights for a guide may be prepared in movable pipe 12b of the actuation pipe 12, and you may make it the configuration which shows migration of each support arms 43a and 43b of the forceps unit 6 by the heights for this guide at the time of closing motion of Jaws 42a and 42b.

[0106] Moreover, drawing 12 (A) and (B) show the 1st modification of the bipolar forceps 1 of

the gestalt of the 1st operation. When a knife 62 moves forward along with the slit 52 of Jaws 42a and 42b at the time of actuation of the knife unit 7, this modification Before the end cutting part 63 at the tip of a knife 62 runs against the front end section of the slit 52 of each jaws 42a and 42b, it runs and dashes against each jaws 42a and 42b, and the section 66 is formed in locations other than the cutting-edge attachment section of the end cutting part 63 at knife 62 tip of the knife unit 7.

[0107] That is, in this modification, as shown in drawing 12 (B), the knife rod 91 of a major diameter is formed from the aperture width of the inlet port of the knife 62 in the slit 52 of each jaws 42a and 42b, and the point of this knife rod 91 is connected with the back end of a knife 62, and it dashes by the point of this knife rod 91, and the section 66 is formed.

[0108] Then, if it is in the thing of the above-mentioned configuration, when a knife 62 moves forward along with the slit 52 of Jaws 42a and 42b at the time of actuation of the knife unit 7 Before the end cutting part 63 at the tip of a knife 62 runs against the front end section of the slit 52 of each jaws 42a and 42b, the point of the knife rod 91 can be dashed against the periphery part of opening of the inlet port of the knife 62 in the slit 52 of each jaws 42a and 42b. After the point of the knife rod 91 runs against the periphery part of opening of the inlet port of the knife 62 in the slit 52 of each jaws 42a and 42b, it becomes impossible and for a knife 62 to move forward more than it.

[0109] Even if it is this modification, like the gestalt of the 1st operation Therefore, the advance working of the knife unit 7, Since it can prevent and cut that the cutting-edge attachment section of the end cutting part 63 of a knife 62 contacts the front end section of the slit 52 of each jaws 42a and 42b directly and a cutting part 63 can be protected There is effectiveness which can be prevented certainly about deformation of the cutting-edge attachment section of the end cutting part 63 of a knife 62, and the sharpness of a knife 62 deteriorating by nick.

[0110] Furthermore, since it can prevent that the cutting-edge attachment section of the end cutting part 63 of a knife 62 contacts the front end section of the slit 52 of each jaws 42a and 42b directly with easy structure in this modification, the cost price also ends at a low price.

[0111] Moreover, by interposing a connection member between the knife 62 in the knife unit 7, and the knife rod 61, and making this connection member larger than the aperture width of the inlet port of the knife 62 in the slit 52 of each jaws 42a and 42b When a knife 62 moves forward along with the slit 52 of Jaws 42a and 42b Before the end cutting part 63 at the tip of a knife 62 runs against the front end section of the slit 52 of each jaws 42a and 42b, you may make it the configuration which dashes this connection member against the periphery part of opening of the inlet port of the knife 62 in the slit 52 of each jaws 42a and 42b.

[0112] Moreover, drawing 13 (A) and (B) show the 2nd modification of the bipolar forceps 1 of the gestalt of the 1st operation. This modification forms the cavities 101a and 101b collapsed in the shape of a cavity in the interior side in each organization grasping sides 45a and 45b between jaw 42a of the forceps unit 6, and 42b, as shown in drawing 13 (B), and it forms the organization non-contact section which does not contact a body tissue by the cavities 101a and 101b of each organization grasping sides 45a and 45b. The organization grasping sections 102a and 102b formed here of a contact part with body tissues other than cavity 101a in each organization grasping sides 45a and 45b and 101b are formed in the constant width which met the peripheral face of Jaws 42a and 42b.

[0113] Next, an operation of the above-mentioned configuration is explained. In this modification, as shown in drawing 13 (B), when a body tissue H is grasped between jaw 42a of the forceps unit 6, and 42b, a body tissue H is compressed in the organization grasping sections 102a and 102b of each organization grasping sides 45a and 45b. At this time, a body tissue H is held in the non-contact condition at the internal surface of the cavities 101a and 101b of each organization grasping sides 45a and 45b.

[0114] And part H1 compressed in the organization grasping sections 102a and 102b when the high frequency current was passed to the forceps unit 6 where a body tissue H is grasped as mentioned above between jaw 42a of the forceps unit 6, and 42b Other incompressible parts H2 It compares, and since resistance is low, the high frequency current concentrates on this part, and it flows. Therefore, part H1 compressed in the organization grasping sections 102a and 102b

in this modification since the touch area with a body tissue H was made small compared with the case where each organization grasping sides 45a and 45b cover the whole surface, contact a body tissue H, and the current density at the time of coagulation becomes low. It is efficient, and the high frequency current can be concentrated and passed. Therefore, part H1 compressed in the organization grasping sections 102a and 102b even when the dimension of Jaws 42a and 42b was enlarged and the incision length of a knife 62 was lengthened. The circumference can be made to solidify efficiently.

[0115] In addition, along with the slit 52 by the side of the interior in each organization grasping sides 45a and 45b between jaw 42a of the forceps unit 6, and 42b, the organization grasping sections 102a and 102b may be formed, and you may make it the configuration which arranges Cavities 101a and 101b to the periphery part of each organization grasping sections 102a and 102b. In this case, part H1 compressed in the organization grasping sections 102a and 102b. Since a solidification range will spread on the outside of Jaws 42a and 42b if the coagulation of a body tissue H progresses when the high frequency current is concentrated and passed, it is effective in being easy to observe the situation of the coagulation of a body tissue H with an endoscope.

[0116] Moreover, drawing 14 (A) and (B) show the 3rd modification of the bipolar forceps 1 of the gestalt of the 1st operation. This modification changes the configuration of the control unit 4 by the side of the hand of the bipolar forceps 1 of the gestalt of the 1st operation as follows.

[0117] That is, in this modification, the movable handle 112 which can be opened and closed is formed in the control unit 4 by the side of the hand of the bipolar forceps 1 to the fixed handle 111 and this fixed handle 111. Furthermore, the ***** rings 111a and 112a which insert a finger are formed in the end face section of each handle 111,112, respectively.

[0118] Moreover, to the point of the fixed handle 111, it has branched in the shape of abbreviation for U characters. And the connection section 113 connected with the end face section of the insertion section 2 is formed in the tee by the side of before, and the connection section 114 with the movable handle 112 is formed in the tee of the backside.

[0119] Furthermore, the connection section 115 with the forceps unit 6 and the connection section 116 with the fixed handle 111 are formed in the point of the movable handle 112. Here, it is connected rotatable through the pin 117 between the connection section 114 of the fixed handle 111, and the connection section 116 of the movable handle 112.

[0120] Moreover, the ratchet mechanism 121 of the stepless type of a configuration of differing in the ratchet mechanism 71 (referring to drawing 9 and drawing 10) of the stepless type of the gestalt of the 1st operation is formed in the control unit 4 of this modification. This ratchet mechanism 121 is constituted as follows.

[0121] That is, the movable handle arm 122 of an approximate circle arc which extends under the ***** ring 111a of the fixed handle 111 is formed in the edge by the side of ***** ring 112a in the movable handle 112.

[0122] furthermore, it is shown in drawing 14 (B) at the margo-inferior section of ***** ring 111a of the fixed handle 111 — as — the movable handle arm 122 and alienation — the inclined plane 123 by which opposite arrangement is carried out is formed. This inclined plane 123 is set up so that it may become large gradually, as the clearance between upper limb radii section 122a of the movable handle arm 122 goes ahead. In addition, the extension include angle beta between upper limb radii section 122a of the movable handle arm 122 and the inclined plane 123 of the fixed handle 111 is set as the proper acute angle include angle.

[0123] Furthermore, the end face section of a locking lever 124 is connected with the fixed handle 111 rotatable focusing on the pivot 125 at the connection section with ***** ring 111a. Moreover, the end section of the lock arm 126 of the shape of abbreviation hemicycle-like flat spring is being fixed to the halfway section of a locking lever 124. The wedge member 127 inserted possible [insertion and detachment] is formed at the other end of this lock arm 126 between upper limb radii section 122a of the movable handle arm 122, and the inclined plane 123 of the fixed handle 111. The rust pipe 129 is formed in this wedge member 127 please support to revolve free [rotation] to the pivot 128 fixed to the other end of the lock arm 126, and this pivot 128.

[0124] Moreover, in this modification, when standing by in the open position which the movable handle 112 left most to the fixed handle 111 of a control unit 4, it is held in the condition of having been extended as the jaws 42a and 42b of the forceps unit 6 in the bipolar forceps 1 showed drawing 1 (B).

[0125] And in the state of this standby, when the movable handle 112 rotates in the direction of a clockwise rotation in drawing 14 (A) to the fixed handle 111 of a control unit 4, hauling actuation of the forceps unit 6 is carried out with rotation actuation of this movable handle 112 at a hand side. It is closed, as the support arms 43a and 43b of the jaws 42a and 42b of the forceps unit 6 are drawn in the actuation pipe 12, the jaws 42a and 42b of the forceps unit 6 resist the spring force of the support arms 43a and 43b and it is shown in drawing 1 (A).

[0126] Moreover, in case the movable handle 112 is rotated to the fixed handle 111 of a control unit 4 and switching operation of each jaws 42a and 42b of the treatment section 3 is performed, the ratchet mechanism 121 of the stepless type of this modification operates as follows. That is, it is held where the rust pipe 129 which goes away wedge member 127 is always inserted between upper limb radii section 122a of the movable handle arm 122, and the inclined plane 123 of the fixed handle 111. And the thrust of the direction extruded leftward is applied to the rust pipe 129 which goes away wedge member 127 in drawing 14 (A) from the movable handle arm 122 during the actuation moved in the handle close direction which left the movable handle 112 most to the fixed handle 111 of a control unit 4 from a position in readiness. Therefore, in this condition, it is held in the state of discharge of friction engagement between each plane of composition of the rust pipe 129 which goes away wedge member 127, upper limb radii section 122a of the movable handle arm 122, and the inclined plane 123 of the fixed handle 111, and it can move the movable handle 112 in the handle close direction freely to the fixed handle 111.

[0127] Here, when rotating the movable handle 112 in the handle open direction conversely to the fixed handle 111 of a control unit 4, the force of the direction drawn rightward is applied to the rust pipe 129 which leaves the movable handle arm 122 wedge member 127 in drawing 14 (A). Therefore, since friction engagement of the rust pipe 129 which goes away wedge member 127 in this condition is carried out between each plane of composition of upper limb radii section 122a of the movable handle arm 122, and the inclined plane 123 of the fixed handle 111, it is prevented that the movable handle 112 rotates in the handle open direction to the fixed handle 111, and a motion of the movable handle 112 at this time is fixed. In addition, immobilization of a motion in the direction which the movable handle 112 rotates in the handle open direction is performed on a stepless story.

[0128] Moreover, in this modification, as a continuous line shows in drawing 14 (A) by rotation actuation of a locking lever 124, the function of a ratchet mechanism 121 carries out change actuation at the ON state held in the effective condition, and the OFF state which makes the function of a ratchet mechanism 121 an invalid all over this drawing as an imaginary line shows.

[0129] And when the locking lever 124 is held by the on position shown as a continuous line in drawing 14 (A), it is held where the rust pipe 129 which goes away wedge member 127 is inserted between upper limb radii section 122a of the movable handle arm 122, and the inclined plane 123 of the fixed handle 111, and the function of a ratchet mechanism 121 is held by the effective ON state.

[0130] Moreover, when a locking lever 124 rotates to the off position shown by the imaginary line in drawing 14 (A), it is switched to the OFF state to which the rust pipe 129 which goes away wedge member 127 is drawn out from between upper limb radii section 122a of the movable handle arm 122, and the inclined planes 123 of the fixed handle 111, and makes the function of a ratchet mechanism 121 an invalid.

[0131] Moreover, drawing 15 and drawing 16 show the 4th modification of the bipolar forceps 1 of the gestalt of the 1st operation. This modification changes the configuration of the socket section 49 of the back end of the forceps unit 6 in the bipolar forceps 1 of the gestalt of the 1st operation as follows.

[0132] That is, the electrical connection 141 which showed drawing 15 is established in the forceps unit 6 of this modification. Two rod part material 142a and 142b projected at the exterior side from the back end side of the multi-lumen tube 44 of the gestalt of the 1st operation is

prepared for this electrical connection 141. These rod part material 142a and 142b is being fixed in the condition of having been inserted in two insertion holes 44a and 44b of the multi-lumen tube 44 of the gestalt of the 1st operation.

[0133] Moreover, the rod part material 142a and 142b is formed with rodding 143 and the insulating tube 144 which covers the peripheral face of this rodding 143. And the point of each rod part material 142a and 142b is connected with the support arms 43a and 43b of Jaws 42a and 42b, respectively.

[0134] Furthermore, as shown in drawing 15, the outcrop of the rodding 143 with which the insulating tube 144 is not covered is formed in the back end section of the part projected at the exterior side from the back end side of the multi-lumen tube 44 in each rod part material 142a and 142b, and the tubular electrode 145 formed in the outcrop of this rodding 143 with electrical conducting materials, such as a metal, is being fixed. Thereby, the tubular electrode 145 whole is exposed and prepared in the exterior side of the multi-lumen tube 44.

[0135] Moreover, corresponding to this electrical connection 141, as shown in drawing 16, the socket receptacle 146 is formed in the interior of the forceps unit connection 15. The receptacle slot 147 in which the tubular electrode 145 is positioned and received is established in this socket receptacle 146.

[0136] And when the electrical connection 141 of the forceps unit 6 of this modification is inserted in the forceps unit connection 15, popularity is won, the pressure welding of the two connection electrodes 54 in receipt crevice 53a of a member 53 is carried out to two tubular electrodes 145 from both sides, respectively, and the tubular electrode 145 and the connection electrode 54 are connected electrically.

[0137] So, in this modification, the socket section 49 of the forceps unit 6 in the gestalt of the 1st operation becomes unnecessary from the multi-lumen tube 44 that what is necessary is just to extend the tubular electrode 145 directly. Therefore, compared with the gestalt of the 1st operation, it can do cheaply, and is effective in the change of the forceps unit 6 which is an article of consumption for a user being comparatively easy.

[0138] In addition, as for this invention, it is needless to say that deformation implementation can be variously carried out in the range which is not limited to the gestalt of the above-mentioned implementation and does not deviate from the summary of this invention. Next, other characteristic technical matters of this application are written in addition as follows.

Account (additional remark term 1) The elastic member which energizes a grasping member in the forceps which have an incision means to operate independently with a grasping member with the bipolar forceps which open and close the grasping member which can be energized using the elastic force of an elastic member, and forceps which have arranged the incision means to juxtaposition.

[0139] (Additional remark term 2) Forceps of the additional remark term 1 which has arranged said elastic member and the incision means in the location offset from the insertion section medial axis.

(Additional remark term 3) Forceps of the additional remark term 2 which established the guidance means for maintaining the offset valve position of an elastic member at the tip of the sheath which engages with said elastic member.

[0140] (Additional remark term 4) Said guidance means are the forceps of the additional remark term 3 which is the crevice prepared so that it might engage with a sheath wall with an elastic member.

(Additional remark term 5) Said guidance means are the forceps of the additional remark term 3 which is the slit prepared in the sheath.

[0141] (The conventional technique of the additional remark terms 1-5) In USP5,458,598 (example 1 of precedence), this grasping member is connected to the elastic member of the circular cross section energized in the direction which opens a grasping member with the forceps which have a knife blade (62) for cutting open the grasping member (22 24) and organization of a pair which have the relation from which each other was insulated as shown in FIG.4. An elastic member is arranged to a medial axis here at the symmetry, and the knife blade is arranged on the medial axis. Longitudinal slide movement is possible for a knife blade in the direction of a

medial axis, and an elastic member opens in the condition of having projected from the tip of a pipe (14), and when the tip and elastic member of a pipe are engaged, a grasping member is closed as shown in FIG.2.

[0142] Moreover, at USP5,573,535 (example 2 of precedence), after this grasping member has been energized by the tabular connection member (38) in the open direction with the forceps which have a blade (52) for cutting open the grasping member (44 45) and organization of a pair which have the relation from which each other was insulated like the example 1 of precedence, it connects. At this time, a connection member is arranged to a medial axis at the symmetry with tabular, and the blade is also arranged on the medial axis. Although it differs the example 1 of precedence, and a little structurally, the approach of operation is the same as the example 1 of precedence.

[0143] (Technical problem which the additional remark terms 1-5 tend to solve) In these forceps, in order to cut open the organization which grasped certainly, sufficient retention span is needed. If the member connected to a grasping member at this time is too soft, the force of holding down an organization cannot become weak and it cannot obtain sufficient retention span. Therefore, in order to obtain sufficient retention span, a section modulus (it becomes such a hard spring that a section modulus is large) with a as large connection member as possible is needed. In arrangement of a connection member as shown in the example of these precedence, in order to have to take interference with a surgical operation into consideration (when especially narrow diameter-ization of forceps is considered), it will become difficult to arrange the large connection member of a section modulus, and it will become the weak forceps of a retention span as a result.

[0144] (The means for solving a technical problem of the additional remark terms 1 and 2) Since the need of taking a mutual interference into consideration by arranging a connection member (elastic member) and an incision means to juxtaposition rather than being symmetrical with a medial axis is lost, it becomes possible to enlarge the section modulus of a connection member.

[0145] (The means for solving a technical problem of the additional remark terms 3-5) When the grasping member has been asymmetrically arranged to a medial axis, in the closed actuation, a connection member will keep according to the direction of a core, and the whole shaft will shift. In order to prevent this gap, a guidance means to show the location of a connection member was established.

[0146] (Effectiveness of the additional remark terms 1-5) Since the section modulus of a connection member can take greatly even if it narrow-diameter-izes forceps, the forceps which have sufficient retention span can be offered.

(Additional remark term 6) Said a part of elastic members [at least] are the forceps of the additional remark term 1 which is the cross-section configuration of the hemicycle which cut the round shape partially and lacked it.

[0147] (Technical problem which the additional remark term 6 tends to solve) However, since it will be hard and a spring will become [reaction force] large if a section modulus is enlarged in order to obtain a retention span as it is the cross-section configuration where an elastic member is fixed, closing motion becomes impossible in the forceps of the type which closes a grasping member against the force of a spring as shown in the example of precedence smoothly. If a section modulus is uniformly made small in order to open and close smoothly, it may become impossible for a retention span to become small as mentioned above, and to ensure incision of an organization.

[0148] (The means for solving a technical problem of the additional remark term 6) The section modulus near [in connection with closing motion of the spring which energizes a grasping member] a hand side was small, and the section modulus near [which is concerned where an organization is grasped] a tip side did not have a uniform section modulus, and was made into the configuration which changes with locations so that it might become large.

[0149] (Effectiveness of the additional remark term 6) Since the section modulus by the side of a hand is small, closing motion is performed smoothly. Since the section modulus by the side of a tip is large, when an organization is grasped, a retention span with it is obtained. [a hard spring and] [strong] That is, a strong retention span is obtained by smooth closing motion.

[0150] (Additional remark term 7) What the fixed means of a handle becomes from the next configuration in the forceps for an operation which have a means to fix the 2nd handle to the 1st handle so that it may not move to an one direction at least while rotating the 1st handle and 2nd handle relatively and performing switching operation of the treatment section. What consists of the 1st holddown member which has the approximate plane or approximate circle peripheral surface prepared in the 1st handle, the 2nd holddown member which has the approximate plane or approximate circle peripheral surface prepared in the 2nd handle, the 1st holddown member and the wedge member between the 2nd holddown member, a press means to push a wedge member in the 1st direction, and a migration means to move a wedge member in the 2nd direction against a press means.

[0151] (Additional remark term 8) What moves in the additional remark term 7 between the 1st location as for which a wedge member carries out friction engagement with both of the 1st and 2nd holddown member, and the 2nd location where it moved in the 2nd direction and the friction engagement to one side of the 1st and 2nd holddown member was canceled at least by the migration means.

[0152] (Additional remark term 9) That to which said friction engagement takes place in the additional remark term 8 when the 1st and 2nd holddown member moves to an opposite direction mutually.

(Additional remark term 10) It sets in the additional remark terms 7-9, and the approximate circle peripheral surface of the 1st holddown member is as approximately concentric as the 1st handle.

[0153] (Additional remark term 11) A wedge member is supported in the additional remark terms 7-10 by the arm member supported to revolve by one side of the 1st and 2nd handle. Said migration means has the pin member which pushes an arm member, said arm member has a slant face and a slot, a wedge member is moved to said 2nd location because a pin member pushes a slant face, it is that a pin member and a slot keep an integrated state temporary still more nearly alternatively, and a wedge member is held in said 2nd location.

[0154] (Additional remark term 12) It sets in the additional remark terms 7-11, and a wedge member is pivotable to said arm member.

(Additional remark term 13) In the additional remark term 12, a wedge member is a member of the shape of a cylinder supported to revolve.

[0155] (Additional remark term 14) What has the lock release lever to which said migration means moves the location of said pin member in the additional remark terms 7-13.

(Additional remark term 15) Such a near thing that the distance between the 1st and 2nd holddown member goes in the 1st direction in the additional remark terms 7-14.

[0156] (Effectiveness of the additional remark terms 7-15) Compared with the conventional ratchet, it is durable possible [immobilization of a handle] in the optimal location which a user likes.

(Additional remark term 16) The tubular member which has an approximate circle form cross-section part, and at least two jaws prepared at the tip of a tubular member, While connecting with the forceps unit which has a means to connect two jaws with at least two connection electrodes prepared in the hand edge of a tubular member, and connection electrodes electrically, and a forceps unit removable and opening and closing a jaw the connection electrode of a forceps unit, and the handle unit which has a connectable electrode electrically — since — the bipolar forceps characterized by having prepared the connection electrode in juxtaposition to the approximate circle form cross section of a tubular member, and the part having exposed it from the tubular member at least in the becoming bipolar forceps.

[0157] (Additional remark term 17) They are the bipolar forceps each other insulated in order to energize the potential from which a connection electrode differs in two jaws in the additional remark term 16.

(Additional remark term 18) They are the bipolar forceps which are made of the long and slender member to which the perimeter exposed the connection electrode from the tubular member in the additional remark terms 16 and 17.

[0158] (Additional remark term 19) They are the bipolar forceps which are buried in the insulating

member which a part of the cross section becomes from resin, and are formed covering the overall length which has exposed the connection electrode outside in the additional remark terms 16 and 17.

[0159] (Additional remark term 20) They are the bipolar forceps to which an insulation of a connection electrode is performed with the multi-lumen tube of resin in the additional remark terms 17-19.

(Additional remark term 21) Bipolar forceps with which the surface preparation which lowers resistance to a connection electrode and the electrode of a handle unit was made in the additional remark terms 16-20.

[0160] (Additional remark term 22) They are the bipolar forceps whose surface preparation is gold plate in the additional remark term 21.

(Additional remark term 23) They are the bipolar forceps whose surface preparation is nickel chromium plating in the additional remark term 22.

[0161] (Additional remark term 24) Bipolar forceps with which the channel penetrated from the distal end to the hand edge is prepared in the forceps unit in the additional remark terms 16-23.

(Additional remark term 25) Bipolar forceps which can insert in a channel the knife rod which has a knife blade at a tip in the additional remark term 24.

[0162] (The conventional technique of the additional remark terms 16-25) It is related with the forceps for endoscopic operations. Peculiar DE2734847C2 and Japanese Patent Application No. No. 241674 [seven to] have from a handle the removable tubular part (forceps unit) which is bipolar coagulation forceps and has a jaw, and two insulated electrodes which performs electrical installation of a tubular part and a handle to the end of a tubular part are prepared in the serial.

[0163] (Technical problem which the additional remark terms 16-25 tend to solve) In the example of precedence, while arranging two electrodes to a serial, in order to insulate mutually, the cylinder-like insulating material is formed between electrodes. Therefore, there was a problem that an electrical connection will become long in the serial direction, and the whole handle will become large as a result. Since it was necessary to maintain reinforcement when connecting an electrode with an insulating material furthermore, there was a problem that the outer diameter of a tubular member could not be made small. Making the outer diameter of a tubular member small poses a serious problem, when preparing the channel penetrated considering multi-functionalization of forceps, for example, maintaining the outer diameter of forceps.

[0164] (The purpose of the additional remark terms 16-25) The additional remark terms 16-25 aim at solving the above problem.

(The means and operation which solve the technical problem of the additional remark terms 16-25) The forceps unit with an approximate circle form cross-section part prepared at least two connection electrodes of a forceps unit in juxtaposition from the handle unit to the approximate circle form cross section in removable bipolar forceps. A connection electrode is electrically connected with the electrode of a handle unit.

[0165] (Effectiveness of the additional remark terms 16-25) When preparing two connection electrodes, structure can be simplified by preparing in juxtaposition, and while it is unnecessary to arrange an insulating member to a serial and it can carry out [narrow diameter]-izing of the forceps unit, the electrical connection of a handle unit and a forceps unit can be shortened. That is, a handle can be made small.

[0166] (Additional remark term 26) The 1st and the 2nd shaft which are displaced relatively, and the 1st shaft connecting means connected to the 1st shaft, The 1st handle which it connects [handle] with the 1st shaft connecting means, and makes the 1st shaft connecting means move, In the forceps for endoscopic operations which have the 2nd shaft connecting means connected to the 2nd shaft, the 2nd shaft connecting means, and the 2nd handle which supports the 1st handle They are the forceps for endoscopic operations which have a guidance means to hold the 1st shaft connecting means in parallel with the 1st shaft, and are characterized by exposing and forming the guidance means in the exterior of the 1st and 2nd handles when the 1st shaft connecting means moves forward and backward.

[0167] (Additional remark term 27) Forceps for endoscopic operations which a jaw opens and

closes because the 1st shaft covers a jaw top when it has the jaw of the pair connected to the distal end of the 2nd shaft in the additional remark term 26 and the 1st shaft and 2nd shaft move relatively.

[0168] (Additional remark term 28) They are the forceps for endoscopic operations with which the 1st shaft connecting means was supported pivotable with the 1st shaft on the basis of the medial axis of the 1st shaft to the 1st handle in the additional remark terms 26 and 27, and the rotation actuation means was formed in the 1st shaft connecting means.

[0169] (Additional remark term 29) They are the forceps for endoscopic operations with which the 2nd shaft connecting means is supported pivotable on the basis of the medial axis of the 1st shaft to the 2nd handle in the additional remark term 28, and rotation actuation of said rotation actuation means is transmitted to the 2nd shaft connecting means and 2nd shaft through said guidance means.

[0170] (Additional remark term 30) They are the forceps for endoscopic operations with which said guidance means consisted of at least one rod part material prepared in the 2nd handle in the additional remark term 26 thru/or 29, and rod part material has penetrated the 1st shaft connecting means.

[0171] (Additional remark term 31) They are the forceps for endoscopic operations with which the end of rod part material is being fixed to the 2nd shaft connecting means in the additional remark term 30.

(Additional remark term 32) They are the forceps for endoscopic operations currently fixed to the approximate circle cylinder part material to which the other end of rod part material positions rod part material in the additional remark term 31.

[0172] (Additional remark term 33) They are the forceps for endoscopic operations operational [in the additional remark terms 26-32 / in the 1st and 2nd handle / with a user's one hand] and operational with the same finger as the finger which a rotation actuation means has on the abbreviation for the 1st handle, and operates an operator's 1st handle.

[0173] (Additional remark term 34) Forceps for endoscopic operations which can energize bipolar potential to a jaw in the additional remark terms 27-33.

(The conventional technique of the additional remark terms 26-34) It is related with the forceps for endoscopic operations. There was a thing which a pipe and a jaw are slid [thing] relatively and makes a jaw open and close like USP4393872 and peculiar DE19512640C2. The thing which the pipe connected to the slider like USP4655219 is slid [thing] forward and backward, and makes a jaw open and close is *****. The slider is guided by the guidance means of a handle body. As for the hand side of a pipe, USP5611813 is similarly held in the cylinder in a handle but. The pipe is connected to the handle which circles in this example of precedence. Moreover, there is no rolling mechanism which rotates a tip jaw around the medial axis of the insertion section. USP5611808 makes a jaw slide, open and close forward and backward. Moreover, it has the rolling mechanism of a tip jaw. JP,9-84808,A slides a pipe forward and backward, and makes a jaw open and close. Moreover, it can decompose into a forceps unit and a handle unit. moreover, a movable handle top — a rotation actuation means — it is — the insertion section — one hand — rotation — it was operational. The hoop direction was combined for the pipe and the forceps unit by projection 44a, and after the turning effort of a rotation actuation means was transmitted to the pipe, it was transmitted to the forceps unit through the projection.

[0174] (Technical problem which the additional remark terms 26-34 tend to solve) With the structure of USP4393872 and peculiar DE19512640C2, when making a pipe slide and the slanting force was added to the pipe, there was a problem that a pipe bent. Especially, it generated notably and this problem had become the hindrance when narrow-diameter-izing forceps, when the outer diameter and thickness of a pipe were small. By USP4655219, a guidance means to support a slider was established for the prevention. Moreover, at USP5611813, the pipe was supported in the cylinder in a handle. However, both did not have the rolling mechanism of a jaw and operability was bad. Moreover, if it sees according to an individual, it is the handle of a slider method, an operating physical force strong against closing motion of a jaw is required, and, generally USP4655219 is not used with the forceps for endoscopic operations. Since a pipe was supported within the closed cylinder, USP5611813 had troublesome washing after use.

USP5611808 — rotation — operational — with this configuration, the jaw moved to the handle but, and operability was not good. When the means (plug splice) of rotation actuation is in the hand edge of forceps, a hand did not reach a rotation actuation means at the time of handle actuation and both hands were not used, rotation actuation was impossible for peculiar DE19512640C2. Although the rotation actuation means was in the pivotable location single hand, JP,9-84805,A needed the projection for the forceps unit, and when a forceps unit was narrow-diameter-ized, the same structure could not be used for it but it had become a problem.

[0175] (The purpose of the additional remark terms 26-34) The additional remark terms 26-34 aim at solving the above problem.

(The means and operation which solve the technical problem of the additional remark terms 26-34) While having the movable handle which circles, and the jaw had maintained the orientation to the handle, it opens and closes with a movable pipe. Moreover, a guidance means to hold a movable pipe in parallel with a movable pipe was established. Furthermore, the movable pipe connecting means and the rotation actuation means were established on the abbreviation for a movable handle. If a movable handle is operated and a movable pipe is made to move, a jaw will be opened and closed to a handle with an orientation. Although the force takes up and down to the movable pipe connecting means connected to the movable handle at this time, since there is a guidance means, a movable pipe connecting means moves horizontally, without moving to the upper and lower sides. Furthermore, if the rotation actuation means formed in the movable pipe connecting means is rotated, turning effort will be transmitted to a tip jaw through a guidance means, and a jaw will rotate. Moreover, since a rotation actuation means is on the abbreviation for a movable handle, it can be operated with the same finger as the finger which operates a movable handle, namely, can carry out one hand actuation.

[0176] (Effectiveness of the additional remark terms 26-34) The force of bending is not applied to a movable pipe, but deformation can be prevented, and the outer diameter of a forceps unit can be made small. Moreover, while the jaw has been an orientation, it opens and closes, and it is easy to operate it by the trigger of a revolution type. Furthermore, since it is exposed out of the handle, it is easy to wash a guide rod. Moreover, since a forceps unit can be rotated grasping a handle single hand by the rotatable knob which arrives in an index finger since [of a trigger] it is right above mostly, operability is good. Moreover, since a forceps unit and a movable pipe rotate to coincidence, the friction reduction at the time of rotation is possible. Moreover, -izing can be carried out [narrow diameter], while means, such as a projection, are unnecessary to a forceps unit and being able to simplify structure.

[0177]

[Effect of the Invention] Since the incision means has been arranged to juxtaposition in the state of offset in the location from which it separated from the migration orbit of the support element of the grasping member at the time of the switching action of the grasping member of a pair according to this invention, even if it narrow-diameter-izes the insertion section inserted in the inside of the body, the large section modulus of the support element of a grasping member can be taken, and sufficient retention span can be obtained.

[Translation done.]

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.*** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the side elevation showing the condition that the jaw of the point of bipolar forceps is opening the side elevation in which (A) shows the outline configuration of the whole bipolar forceps, and (B) by showing the gestalt of operation of the 1st of this invention.

[Drawing 2] The side elevation showing the condition of having disassembled the bipolar forceps of the gestalt of the 1st operation for every unit.

[Drawing 3] For the side elevation showing the jaw of the point of the bipolar forceps of the gestalt of the 1st operation, and (B), the B-B line sectional view of (A) and (C) are [(A)] the C-C line sectional view of (A).

[Drawing 4] For the cross-sectional view of the forceps unit back end section of the bipolar forceps of the gestalt of the 1st operation, and (B), the B-B line sectional view of (A) and (C) are [(A)] the C-C line sectional view of (A).

[Drawing 5] For (A), drawing of longitudinal section showing the internal configuration of the forceps unit connection of the handle unit in the bipolar forceps of the gestalt of the 1st operation and (B) are the B-B line sectional view of (A).

[Drawing 6] The cross-sectional view of an important section showing the arrangement condition of the elastic member of the jaw of the gestalt of the 1st operation, and a knife unit.

[Drawing 7] For (A), drawing of longitudinal section showing the wearing condition of the knife in the point of the bipolar forceps of the gestalt of the 1st operation and (B) are this top view.

[Drawing 8] For (A), drawing of longitudinal section showing the attaching structure of the rotatable knob in the bipolar forceps of the gestalt of the 1st operation and (B) are the B-B line sectional view of (A).

[Drawing 9] Drawing of longitudinal section of an important section showing the ON state which enables the 1st function of the ratchet mechanism of the bipolar forceps of the gestalt of operation.

[Drawing 10] Drawing of longitudinal section of an important section showing the condition of having switched to the OFF state which makes an invalid the 1st function of the ratchet mechanism of the bipolar forceps of the gestalt of operation.

[Drawing 11] The cross-sectional view of an important section showing the bipolar forceps of the gestalt of operation of the 2nd of this invention.

[Drawing 12] Drawing of longitudinal section in which showing the 1st modification of the bipolar forceps of the gestalt of the 1st operation, and showing the wearing condition of a knife [in / in (A) / the point of bipolar forceps], and (B) are this top view.

[Drawing 13] The top view in which being able to set (A) to the point of bipolar forceps and showing the grasping condition of a body tissue by showing the 2nd modification of the bipolar forceps of the gestalt of the 1st operation, and (B) are the B-B line sectional view of (A).

[Drawing 14] The side elevation in which the 3rd modification of the bipolar forceps of the gestalt of the 1st operation is shown, and (A) shows the outline configuration of the whole control unit by the side of the hand of bipolar forceps, and (B) are the side elevation of the important section of the ratchet mechanism of a stepless type.

[Drawing 15] Drawing of longitudinal section of an important section showing the 4th modification

of the bipolar forceps of the gestalt of the 1st operation.

[Drawing 16] Drawing of longitudinal section showing the internal configuration of the forceps unit connection of the 4th modification.

[Description of Notations]

2 Insertion Section

42a, 42b Jaw (grasping member)

43a, 43b Support arm (support element)

62 Knife (Incision Means)

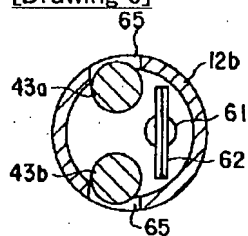
H Body tissue

[Translation done.]

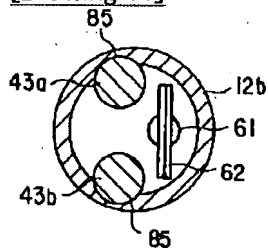
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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

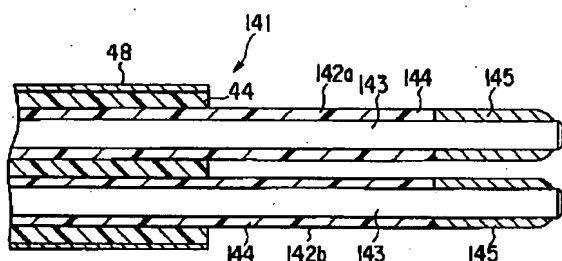
[Drawing 1]



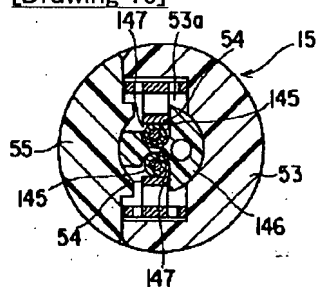
[Drawing 11]



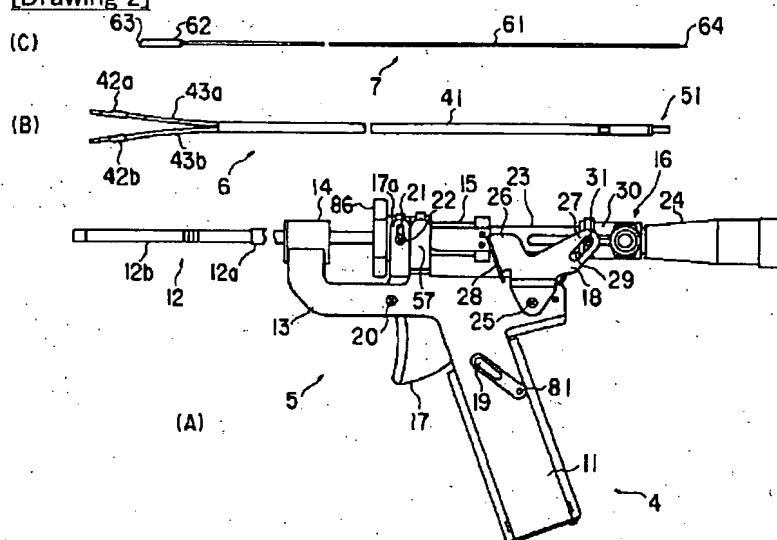
[Drawing 15]



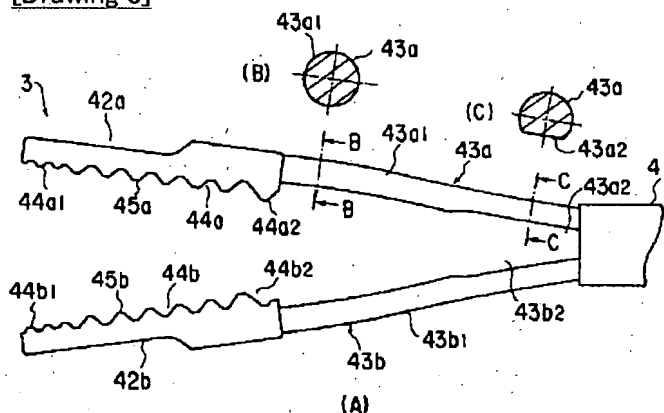
[Drawing 16]



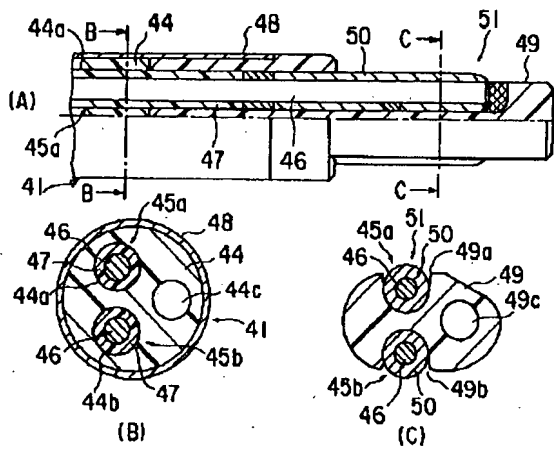
[Drawing 2]



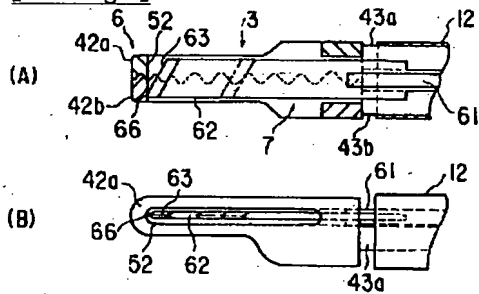
[Drawing 3]



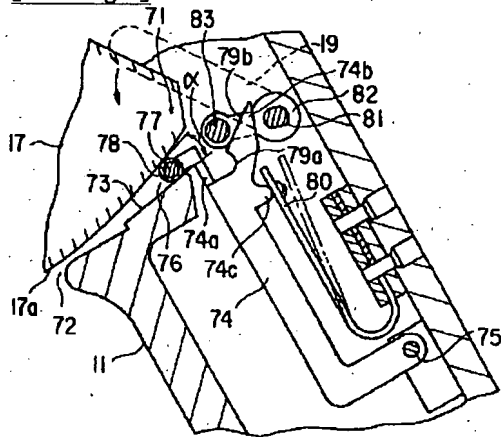
[Drawing 4]



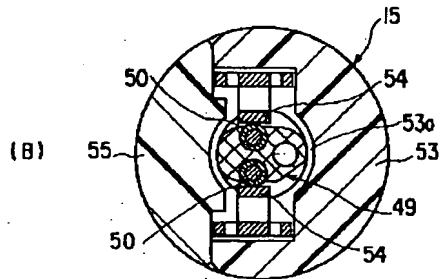
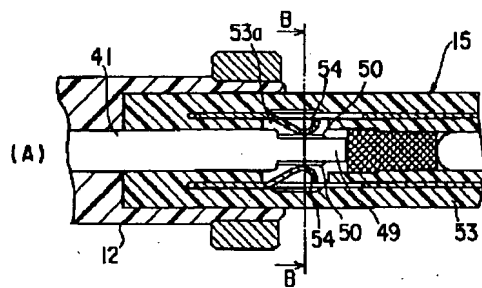
[Drawing 7]



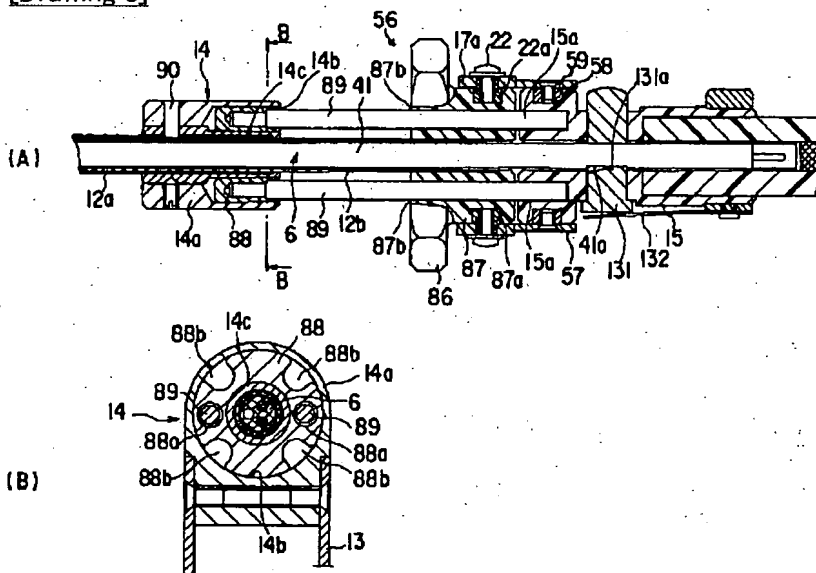
[Drawing 9]



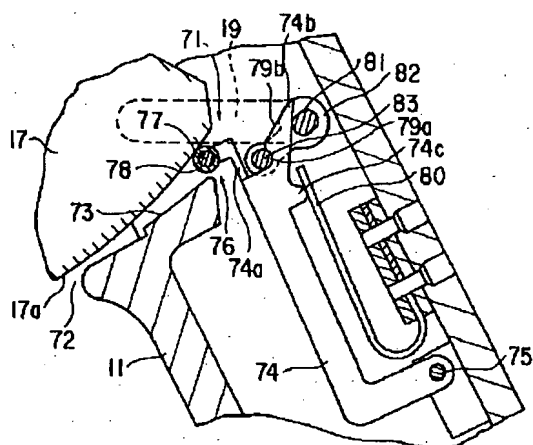
[Drawing 5]



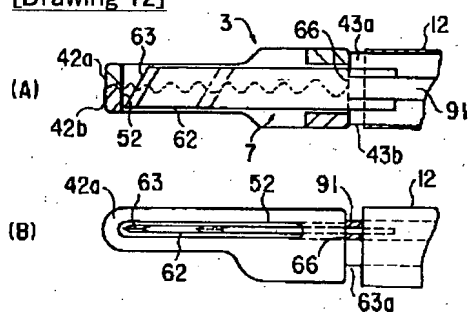
[Drawing 8]



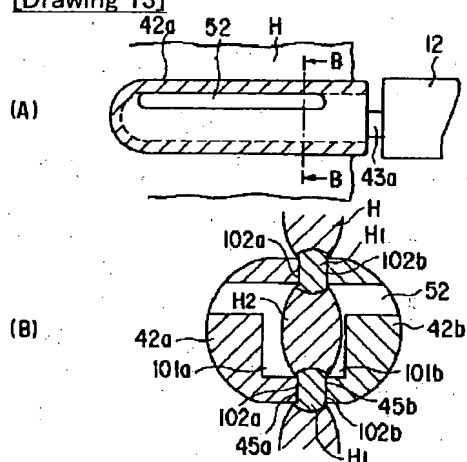
[Drawing 10]



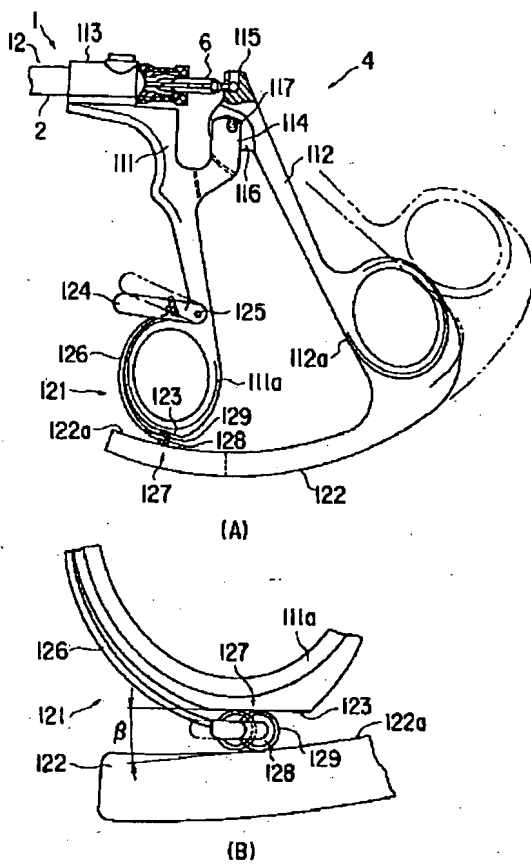
[Drawing 12]



[Drawing 13]



[Drawing 14]



[Translation done.]